

Warmup. (2013)

$$y = x^3 - 4x^2 + 2x - 1$$

1. Graph on your calculator. Sketch it.
 2. Is it an odd or even function?
 3. Describe the end behavior.
 4. How many real zeros? Find them.
 5. How many relative maximums? Find them.
 6. How many relative minimums? Find them.
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7. Sketch an even degree polynomial function with 1 relative max and 2 relative min.
 8. Sketch a poly. function with a degree of 5, a negative leading coefficient, and the max. # turning points.

7.3 Solving Equations Using Quadratic Techniques

ex 1:

$$x^4 - 29x^2 + 100 = 0$$

$$\text{Let } x^2 = u$$

$$u^2 - 29u + 100 = 0$$

$$(u - 25)(u - 4) = 0$$

$$\frac{u}{\sqrt{x^2}} = \frac{25}{\sqrt{x^2}} \quad \frac{u}{\sqrt{x^2}} = \frac{4}{\sqrt{x^2}}$$

$$x = \pm 5 \quad x = \pm 2$$

$$\{\pm 5, \pm 2\}$$

If middle power
is $\frac{1}{2}$ of degree
then we
can use quad.
technique

$$(a \pm b)(a^2 \mp ab + b^2)$$

ex 2:

$$x^3 + 216 = 0$$

$$\sqrt[3]{x^3} = \sqrt[3]{-216}$$

$$x = -6$$

$$(x+6)(x^2-6x+36)=0 \quad \text{Factor as a Sum of Cubes}$$

$$x = -6$$

$$x = \frac{-6 \pm \sqrt{36 - 4(1)(36)}}{2}$$

$$\{-6, 3 \pm 3i\sqrt{3}\}$$

ex 3:

$$x^{\frac{1}{2}} - x^{\frac{1}{4}} - 6 = 0$$

$$u^2 - u - 6 = 0$$

$$(u-3)(u+2) = 0$$

$$u = 3 \quad u = -2$$

$$(x^{\frac{1}{4}})^4 = 3^4 \quad (x^{\frac{1}{4}})^4 = (-2)^4$$

$$x = 81 \checkmark \quad x = 16 \times$$

$$\{81\}$$

$$\text{Let } u = x^{\frac{1}{4}}$$

$$u^2 = (x^{\frac{1}{4}})^2$$

$$u^2 = x^{\frac{1}{2}}$$

Check answer

ex 4: $16 + 8$ $Let u = x^{\frac{1}{3}}$

$$x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 24 = 0$$

$$u^2 - 2u - 24 = 0$$

$$(u - 6)(u + 4) = 0$$

$$\begin{matrix} u = 6 & u = -4 \\ (x^{\frac{1}{3}})^3 = 6^3 & (x^{\frac{1}{3}})^3 = (-4)^3 \\ x = 216 & x = -64 \end{matrix}$$

$$\{-64, 216\}$$

ex 5:

$$x^5 - 81x = 0$$

$$x(x^4 - 81) = 0$$

$$x(x^2 - 9)(x^2 + 9) = 0$$

$$x(x^2 + 9)(x + 3)(x - 3) = 0$$

$$x = 0 \quad \sqrt{x^2} = \sqrt{9} \quad x = -3 \quad x = 3$$

$$x = \pm 3i$$

$$\{0, \pm 3, \pm 3i\}$$

Another way to solve a radical equation

ex 6:

$$x + \sqrt{x} = 12$$

HW

p363

11-15 odd 18-20, 23,
27, 29 (grouping)